AGEP Alliances for Graduate Education and the Professoriate

Info Brief III

Increases in the Annual Number and Percent of PhDs Awarded to Underrepresented Minorities in STEM at AGEP Institutions

Prepared by Yolanda S. George and Shirley M. Malcom, AAAS
Patricia B. Campbell, PhD Tom Kibler and Rosa Carson, Campbell-Kibler Associates, Inc.

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American Association for the Advancement of Science (AAAS)
Directorate for Education and Human Resources Programs
Attn: AGEP Program
1200 New York Avenue, NW
Washington , DC 20005
202-326-6631
202-371-9849 (fax)
mge@aaas.org
AGEP Web site - http://www.nsfagep.org/

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SUMMARY

One of the goals of the National Science Foundation (NSF) Alliances for Graduate Education and the Professoriate (AGEP) Program, which began in 1998, is to increase the number of underrepresented minorities (URM) receiving PhD degrees in science, technology, engineering, and mathematics (STEM) (See program description at bottom of page)[1]. Early analyses of data on PhDs awarded at AGEP institutions indicate that the AGEP Program is achieving this goal.

- In 2004/05, 640 STEM PhDs were awarded to URM by 69 AGEP institutions from 20 Alliances, representing 44.8% (640/1,428) of all STEM PhDs in the U.S. awarded to URM who were U.S. citizens or permanent residents.
- An analysis of the PhDs awarded to URM from 1997/98 to 2004/05 at 62 institutions from 20 Alliances indicates that the annual percent and number of PhDs awarded to URM in STEM fields increased by 56 or 10.3%[2]. Changes in the annual numbers of PhDs awarded to URM were mostly due to changes in the numbers of PhDs awarded in the Biological/ Agricultural Sciences (24), the Physical Sciences (18), and the Social Sciences (12) *(Table 1).*
- From 1997/98 to 2004/05 the annual percent of STEM PhDs awarded increased for URM by 10.3% and decreased for all other U.S. citizens or permanent residents (-6.2%) *(Table 4).* With the exception of the Biological/Agricultural Sciences, where there was a 9.2% increase, there were declines in the number of PhD recipients for all other U.S. citizens or permanent residents in all other fields *(Table 3).* The declines in the annual percent of PhDs awarded in Psychology for URM was about the same as for all other U.S. citizens or permanent residents (-6.3% vs -7.1%) *(Table 4 and Figure 1).*

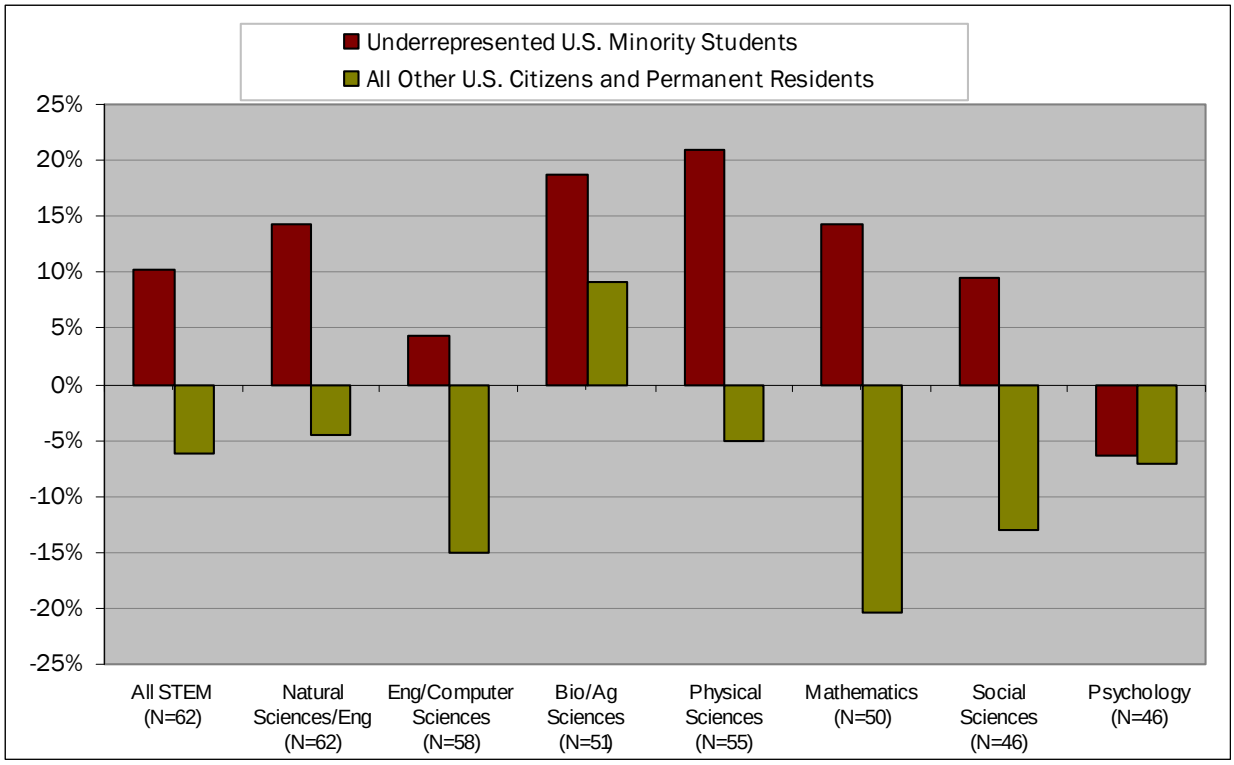
This increase in annual percent and number of PhDs awarded to URM represents an increase six years after the implementation of the AGEP Program. Given that time-to-PhD degree can be as long

[1]**Program Description:** The goal of the National Science Foundation (NSF) Alliances for Graduate Education and the Professoriate (AGEP) Program is to increase the number of underrepresented minority students pursuing advanced study, obtaining doctoral degrees, and entering the professoriate in STEM disciplines (including social sciences). Alliances participating in this program are expected to engage in comprehensive institutional cultural changes that will lead to sustained increases in the conferral of STEM doctoral degrees, significantly exceeding historic levels of performance. Specific objectives of AGEP are: (1) to develop and implement innovative models for recruiting, mentoring, and advancing minority students in STEM doctoral programs and (2) to develop effective strategies for identifying and supporting underrepresented minorities who want to pursue academic careers.

[2]In the pre/mid-year change, there was an absolute increase of 61 URM PhD recipients in STEM fields; however, since there was a decrease of five students in Psychology, the overall increase was 56.

as seven years in some STEM fields, most of this increase in the annual number of PhDs awarded to URM could be due to increased retention.

Figure 1: Percent Change in the Numbers of PhDs Awarded in Broad STEM Categories to Underrepresented Minorities* and All Other U.S. Citizens or Permanent Residents in AGEP Institutions between Pre-AGEP (1997/98-1999/00) and Mid-AGEP (2003/04-2004/05)Years (N=62 Institutions)**



*URM include African Americans, Hispanic Americans, and Native Americans.
**See Table 4 for numbers and percentages.

Analysis of PhDs Awarded at AGEP Institutions (1997/98 to 2004/05)

In 2004/05, 640 STEM PhDs were awarded to URM by 69 AGEP institutions, from 20 Alliances representing 44.8% (640/1,428) of all the STEM PhDs awarded to URM in the U.S. Sixty-two of the 75 AGEP institutions which provided any data, provided enough data to be included in the analysis of the change in the number of PhDs awarded to URM from 1997/98 to 2004/05. The 62 institutions submitted data on URM and for all other U.S. citizens or permanent residents for at least one broad category of STEM fields. To reduce the volatility of annual "PhD-awarded" data, the data were grouped into three categories: the Pre-AGEP Years (1997/98 to 1999/00); the Early

AGEP Years (2000/01 to 2002/03); and the Mid-AGEP years (2003/04 to 2004/05). Analysis of these data indicates:

- The average annual number of PhDs awarded to URM in STEM fields by the 62 AGEP institutions for 2003/04 to 2004/05 was 602. Of the average annual number of PhDs awarded to URM in STEM fields by the 62 AGEP institutions for 2003/04 to 2004/05:
    - 390 or 64.8% were in Natural Sciences and Engineering (NS&E) fields.
    - 138 or 22.9% were in the Social Sciences.
    - 74 or 12.3% were in Psychology *(Table 1).*
- Of the average annual number of PhDs awarded by the 62 AGEP institutions to URM in NS&E fields (390) for 2003/04 to 2004/05:
    - 118 or 30.2% were in Engineering and Computer Sciences.
    - 152 or 39% were in the Biological/Agricultural Sciences.
    - 104 pr 26.7% were in the Physical Sciences.
    - 16 or 4.1% were in Mathematics *(Table 1).*
- The average annual percent of PhDs awarded to URM in STEM fields by the 62 AGEP institutions between 1997/98 and 2004/05 increased by 10.3%, and the average annual number increased by 56. Actual increases in the average annual number and percent of PhDs awarded to URM in STEM fields between 1997/98 and 2004/05 were due to increases in the Physical Sciences (18 or 20.9%), the Biological/Agricultural Sciences (24 or 18.8%) and the Social Sciences (12 or 9.5%) *(Table 1).*
- The number of PhDs awarded to URM at the nine University of California (UC) campuses accounted for nearly a quarter (147 of 602 or 24.4%) of the average annual number of PhDs awarded to URM for 2003/04 to 2004/05. Of the 147 PhDs awarded to URM at UC, 92 or 62.6% were in NS&E; 39 or 26.5% were in the Social Sciences; and 16 or 10.9% were in Psychology. Of the 92 NS&E PhDs awarded to URM by UC for 2003/04 and 2004/05:
    - 39 or 42.4% were in the Biological/Agricultural Sciences.
    - 34 or 37% were in the Physical Sciences.
    - 15 or 16.3% were in Engineering and Computer Sciences.
    - 4 or 4.3% were in Mathematics *(Table 2).*
- The average annual percent of PhDs awarded to URM in STEM fields by UC between 1997/98 to 2004/05 increased by 2.8% (from 143 to 147). The average annual number of PhDs awarded to URM at UC increased by four.[3] However, for the pre/midyear change there was an absolute increase of 17 URM PhD recipients in STEM fields at UC; but as

[3]In At the same time the number of PhDs awarded to all other U.S. students or permanent residents by UC increased from 1601 to 1663, an increase of 62 or 3.9%.

there was a decrease of eight students in Biological/Agricultural Sciences, four in Social Sciences, and one in Mathematics, the overall increase was four. In terms of absolute numbers, UC accounted for 17 of 61, or 27.9% of the change in new PhDs awarded to URM by AGEP institutions. This change was largely due to increases in the number of PhDs awarded in the Physical Sciences (from 19 to 34 or an increase of 78.9%) *(Table 2).*

- As indicated in Table 4, from 1997/98 to 2004/05 the annual percent of STEM PhDs awarded URM increased by 10.3% and decreased for all other U.S. citizens or permanent residents (-6.2%). The average annual percent change of PhDs awarded from 1997/98 to 2004/05 decreased in every STEM field for all other U.S. citizens or permanent residents except for the Biological/Agricultural Sciences (18.8% vs 9.2%). Percents increased for URM in all fields except Psychology *(Table 4 and Figure 1).*

Table 1 -- Changes in the Average Annual Number and Percent of PhDs Awarded to URM in Broad STEM Categories from 1997/98 to 2004/05 (N= 62 Institutions, including Nine Campuses of the University of California)

STEM Categories (Number of Institutions with Usable Data)	Pre-AGEP Years 1997/98 to 1999/00	Early AGEP Years 2000/01 to 2002/03	Mid-AGEP Years 2003/04 to 2004/05	Pre/Mid-Years Change (Mid-AGEP-Pre-AGEP)*	Pre/Mid-Years Percent Change (Mid-AGEP-Pre-AGEP)/ Pre-AGEP
All Natural Sciences & Engineering (62)	341	340	390	49	14.4%
Engineering/Computer Sciences (58)	113	106	118	5	4.4%
Biological/Agricultural Sciences (51)	128	114	152	24	18.8%
Physical Sciences(55)	86	106	104	18	20.9%
Mathematics (50)	14	14	16	2	14.3%
Social Sciences (46)	126	156	138	12	9.5%
Psychology (46)	79	72	74	-5	-6.3%
All STEM Fields (62)	546	568	602	56	10.3%

*For the pre/mid-year change, there was an absolute increase of 61 URM PhD recipients in STEM fields; however, as there was a total decrease of five students in Psychology, the overall increase was 56.

Table 2 -- Changes in the Average Annual Number and Percent of PhDs Awarded to URM in Broad STEM Categories from 1997/98 to 2004/05 at the Nine Campuses of the University of California

STEM Categories (Number of Institutions with Usable Data)	Pre-AGEP Years 1997/98 to 1999/00	Early AGEP Years 2000/01 to 2002/03	Mid-AGEP Years 2003/04 to 2004/05	Pre/Mid-Years Change (Mid-AGEP-Pre-AGEP)*	Pre/Mid-Years Percent Change (Mid-AGEP-Pre-AGEP)/ Pre-AGEP
All Natural Sciences & Engineering (9)	86	93	92	6	7.0%
Engineering/Computer Sciences (9)	15	18	15	0	0.0%
Biological/Agricultural Science (9)	47	44	39	-8	-17.0%
Physical Sciences(9)	19	28	34	15	78.9%
Mathematics (9)	5	3	4	-1	-20.0%
Social Sciences (9)	43	44	39	-4	-9.3%
Psychology (9)	14	15	16	2	14.3%
All STEM Fields (9)	143	152	147	4	2.8%

*For the pre/mid-year change, there was an absolute increase of 17 URM PhD recipients in STEM fields at UC; however, as there was a decrease of eight students in Biological/Agricultural Sciences, four in Social Sciences and one in Mathematics, the overall increase was four.

Table 3 -- Changes in the Average Annual Number and Percent of PhDs Awarded to All Other U.S. Citizens or Permanent Residents in Broad STEM Categories from 1997/98 to 2004/05 (N= 62 Institutions, including Nine Campuses of the University of California)

STEM Categories (Number of Institutions with Usable Data)	Pre-AGEP Years 1997/98 to 1999/00	Early AGEP Years 2000/01 to 2002/03	Mid-AGEP Years 2003/04 to 2004/05	Pre/Mid-Years Change (Mid-AGEP-Pre-AGEP)	Pre/Mid-Years Percent Change (Mid-AGEP-Pre-AGEP)/ Pre-AGEP
All Natural Sciences & Engineering (62)	4,331	3,909	4,136	-195	-4.5%
Engineering/Computer Sciences (58)	1,469	1,174	1,248	-221	-15.0%
Biological/Agricultural Sciences (51)	1,453	1,396	1,586	133	9.2%
Physical Sciences(55)	1,173	1,157	1,114	-59	-5.0%
Mathematics (50)	236	182	188	-48	-20.3%
Social Sciences (46)	1,034	962	900	-134	-13.0%
Psychology (46)	476	459	442	-34	-7.1%
All STEM Fields (62)	5,841	5,330	5,478	-363	-6.2%

Table 4 -- Changes in the Average Annual Number and Percent of PhDs Awarded to All Other U.S. Students or Permanent Residents and Percent Change in PhDs Awarded to URM from 1997/98 to 2004/05

STEM Categories (Number of Institutions with Usable Data)	Pre-AGEP Years 1997/98 to 1999/00	Early AGEP Years 2000/01 to 2002/03	Mid-AGEP Years 2003/04 to 2004/05	Pre/Mid-Years Change (Mid-AGEP -Pre-AGEP)	Pre/Mid-Years Percent Change for All Other US Students	Pre/Mid-Years Percent Change for URM
All Natural Sciences & Engineering (62)	4,331	3,909	4,136	-195	-4.5%	14.4%
Engineering/ Computer Sciences (58)	1,469	1,174	1,248	-221	-15.0%	4.4%
Biological/ Agricultural (51)	1,453	1,396	1,586	133	9.2%	18.8%
Physical Sciences (55)	1,173	1,157	1,114	-59	-5.0%	20.9%
Mathematics (50)	236	182	188	-48	-20.3%	14.3%
Social Sciences (46)	1,034	962	900	-134	-13.0%	9.5%
Psychology (46)	476	459	442	-34	-7.1%	-6.3%
All STEM Fields (62)	5,841	5,330	5,478	-363	-6.2%	10.3%